

WHAT IS CLAIMED IS:

1. A disk drive for perpendicular magnetic recording, comprising:

5 a disk medium configured to have a soft magnetic layer between a magnetic recording layer for recording data and a substrate; and

10 a magnetic head configured to have a read head element and a shielding member over the disk medium, the read head element being configured to detect a recording magnetic field from the magnetic recording layer and the shielding member being configured to shield the read head element, wherein a resultant structure is configured to suppress a magnetic field strength which adversely affects the read head element under a magnetic disturbance applied in a thickness direction of the disk medium.

15 2. A disk drive according to claim 1, wherein the disk medium is comprised of a double-layered recording medium capable of effecting a magnetic recording of a perpendicular magnetic system and the magnetic head is configured to include a write head element to allow a magnetic recording operation to be performed on the disk medium by a perpendicular magnetic system.

20 3. A disk drive according to claim 1, wherein the read head element is provided, as a constituent element of the magnetic head, in a form separate from the write head element for effecting magnetic recording

on the disk medium, the read head element including a magnetoresistive element arranged between such shielding members.

4. A disk drive according to claim 1, wherein
5 the read head element includes a magnetism-detection element comprised of a giant magnetoresistive element.

5. A disk drive for perpendicular magnetic recording; comprising:

a disk medium configured to have a soft magnetic
10 layer between a magnetic recording layer for recording data and a substrate and capable of effecting a perpendicular magnetic recording; and

a magnetic head configured to have a read head
element and a write head element in a separate form
15 over the disk medium, the read head element being configured to detect a recording magnetic field from the magnetic recording layer and be shielded by a shielding member and the write head element being configured to effect a perpendicular magnetic
20 recording, wherein a resultant structure is such that, in order to suppress a magnetic disturbance which is applied in a perpendicular direction corresponding to a thickness direction of the disk medium from adversely affecting the read head element with the magnetic head
25 set over the disk medium, that is, suppress a magnetic disturbance within an allowable range, the thickness of the soft magnetic layer, the distance from one of such

shielding members to the other with the read head element in between, and the spacing distance from a surface of the soft magnetic layer to a proximal end of the magnetic head are all set.

5 6. A disk drive according to claim 5, wherein the read head element is provided, as a constituent element of the magnetic head, in a form separate from the write head element for effecting a magnetic recording on the disk medium, and includes a magnetoresistive element
10 arranged between such shielding members.

7. A disk drive according to claim 5, wherein the read head element includes a magnetism-detection element comprised of a giant magnetoresistive element.

15 8. A disk drive for perpendicular magnetic recording, comprising:

a disk medium configured to have a soft magnetic layer between a magnetic recording layer for recording data and a substrate; and

a magnetic head configured to have, over the disk
20 medium, a read head element configured to detect a recording magnetic field from the magnetic recording layer and a shielding member configured to shield the read head element, wherein a resultant structure is configured to satisfy a relation

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$$\operatorname{tg}(\mu - 4\pi(1 - \exp(-\pi t/g))) < 2\pi d(d+t) \text{ where}$$

t: the thickness of the soft magnetic layer;
 μ : the permeability of a direction perpendicular

to the surface of the soft magnetic layer when an influence of a diamagnetic field is removed;

g: the distance from one of such shielding members to the other shielding member with the read head element in between; and

d: the spacing distance from the surface of the soft magnetic layer to a proximal end of the magnetic head.

10 9. A disk drive according to claim 8, wherein the disk medium is comprised of a double-layered recording medium capable of effecting a perpendicular magnetic recording as a magnetic recording and the magnetic head includes a write head element configured to effect a perpendicular magnetic recording operation as a magnetic recording operation on the disk medium.

15 10. A disk drive according to claim 8, wherein the read head element is provided, as a constituent element of the magnetic head, in a form separate from the write head element configured to effect magnetic recording on the disk medium, and includes a magnetoresistive element arranged between such shielding members.

20 11. A disk drive according to claim 8, wherein the read head element includes a magnetism-detection element comprised of a giant magnetoresistive element.